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ABSTRACT

This paper discusses the use of WebQuest, a World Wide Web-based multi-user game, in promoting learning motivation and navigation skills in K-9 students. WebQuest demonstrates ways to integrate games, Internet communication facilities, Web-based courseware, and database techniques together in order to assist learning. The following guidelines for designing the educational game script are discussed: selection of the style of the game; arranging the game script according to the learning hierarchy to prevent disorientation; and building a situated learning environment to promote learning motivation and to prevent disorientation. Results of an experiment in which eight classes used the game are presented; findings indicate improvement in all motivation factors (i.e., fantasy, cognition, curiosity, control, cooperation, competition, and challenge). Two figures illustrate the learning hierarchy and game structure, and querying the script structure and information of other players. Three tables present action statistics of students playing the game, a comparison of motivation factors, and a comparison of motivation factors between high and low achievement students. (DLS)

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Promoting Motivation and Eliminating Disorientation for Web Based Courses by a Multi-user Game

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Abstract

Elementary school students have difficulty in using link and may be disoriented when studying web-based courseware. Moreover, they may not be interested in reading courseware. In this paper, we devised a methodology to promote the learning motivation and to prevent navigation disorientation by using a multi-user game that integrated with web-based courseware. Experiments of our implemented game show that the game does improve the motivation of the students in practicing and learning. At the same time, the students do not have the problem of disorientation in using the game. Analysis and discussion for the effect of the motivation factors of the game is also presented. This information provides guidelines for designing instructional game script.

Introduction

World Wide Web is very popular and easy accessed so that a lot of teachers put their teaching materials on the web. However, students need to know how to use links. Moreover, the student should keep in mind the structure and access paths of the courseware to prevent disorientation. This may be not difficult for university or senior high school students. It may be not easy for K-9 students [Corrina et al., 1996]. On the other hand, K-9 students do not have difficulty in playing computer games. The students can soon figure out the script structure of the game and know how to play it and navigate in the game script. Besides, those students can sit and play games for a long period of time. On the contrary, it is not easy to keep them concentrate on the courseware for a short time if no interesting things is embedded in the courseware.

It may be a good idea that we integrate a computer game with learning materials. Since students likes to play a game, the students may have more motivation to learn. The students may be more willing and persistent to learn. At the same time, if we design the game script based on the learning hierarchy and flow of the courseware, the student may not be disoriented in learning. By showing the structure of the game script, which is easy to be comprehended by the students, the students will always know where he/she is and where he/she should go next.

Before the computer network becomes so popular today, most of the games are single user games. In a single user game, the player always fights with simulated enemies generated by the game program. Usually, the simulated enemies use a same strategy in a same situation. Hence, once the player overcomes a problem in a game. That part becomes no interesting for her/him. Besides, students may abandon if they are not able to play the game well in the beginning.

Owing to the popular of the computer network, games can be designed as multi-user games. A multi-user game provides an environment for players to fight with real persons or to compete and cooperate with other players. Even for same scenery, players still face an unknown situation because real persons will change their strategies. Thus, a multi-user game becomes a social environment and can keep on being interested in for players. Moreover, if a player/student has orientation problem, other player can assist the players that are in trouble when the game has the facilities and encourage players to do so. Therefore, we can embed learning materials into a multi-user computer game to improve the motivation of the students. And, the student can learn in a social environment.

The primary reason of embedding learning materials into a multi-user computer game is to promote the learning motivation of the students. Lepper and Malone [Malone and Lepper,1981] investigated what makes a computer game fun. They [Lepper, 1988] [Malone and Lepper, 1987] [Stipdk ,1993] found that motivation factors can be divided into two groups: intrinsic motivation and extrinsic motivation. The motivation factors of a single user game are mostly related to intrinsic motivation. The intrinsic motivation factors includes: challenge, curiosity, engagement, autonomy and fantasy.

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When Lepper and Malone studied computer games, most computer games are only single user games. Therefore, the factors considered in what make computer games fun are related to intrinsic motivation. However, in a multi-user game, extrinsic motivati on factors should be included. The extrinsic includes: competition, collaboration, and recognition.

Another reason for developing a multi-user instructional game is that a multi-user game has the possibility of building a situated learning environment. The game simulates a social environment that students can learn and practice the learning materials in a real situation. Lave and Wenger [Lave and Wenger,1991] presented their idea and proposed elements about situated learning. We list the some ideas of Lave's situated learning: Community of practice, Periphery, full participation, identity, Opportunity, learn to talk, not learn from talk, and access.

In this paper, we describe a multi-user instructional game that can motivate and guide students to learn and practice courseware on the web. This game demonstrates a way to integrate games, internet communication facilities, courseware in the web, and database techniques together for assisting learning. Thus we can promote the learning motivation of the students and prevent the students from disorientation in navigating the courseware. Besides, experiments are done to analyze the effect of the motivation
factors in the game.

Related Systems

Many ideas of our multi-user game come from Multi-User Dungeon MUD games. A MUD game is a text base game. In a MUD game, there are (1) levels of players and (2) communication tool such as talk and chat room. Each level in MUD has different privileges. Thus, it forms a player community. Because it is a text base game, it provides users imagination possibilities. However, it is not suitable for elementary school students. We adopt its ideas to form a community of practice.

WebQuest [Corrina et al., 1996] is a web based instructional game. The students ramble about in the game to find related information to pass a scene. When facing with problems, the students can invoke a web browser to find the answer. The students can design their own game. Experiment shows that the students more like to design a game than to play the game. They did not try to build a community of practice in the game.

Game Script and Learning Materials

selection of the style of the game

The first thing of developing a instructional game is to design a game script and put learning materials into the game. Since a learning material always has a learning hierarchy [Gange, 1968], the game script should follows the learning hierarchy. Therefore, we decide to implement our game as a role playing for the following reasons. First, role-playing games are the most popular games in Taiwan and this style of games allows player to explore and think. Second, a role playing game always has a hierarchical script structure. Thus, it is easy to design the game script according to the learning hierarchy so navigation disorientation can be eliminated. Third, a multi-user role playing game can form an environment to serve as a community of practice.

Arranging the game script according to the learning hierarchy to prevent disorientation

Figure-1 is a learning hierarchy for arithmetic skills. Each box represents a subskill. The arrow line represents the legal learning flow. The bar line represents an *and* join. A student should learn all the subskills connected to the bar line.

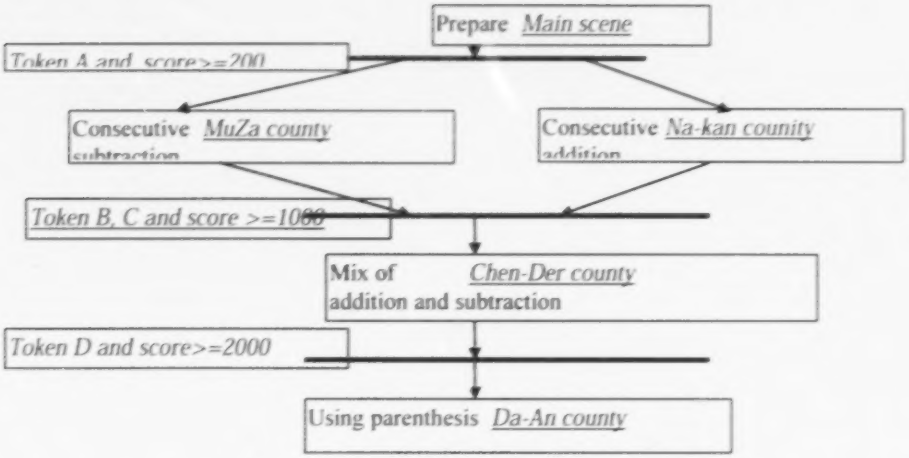

Figure-1 Learning hierarchy and game structure

We can design a hierarchy of script scenery based on the learning hierarchy as shown in Figure-1. The text in *italic* form is of the game script. Each learning element or box is a scene or an act. In the scene, the background is a place in Taipei city with roles in it which give hints, asking question, and lecturing through page in world wide web. The player is trying to get scores and the token by studying courseware or practicing exercises.

Players should get enough score or token in order to get into another act or scene. The condition of passing is stored in the bar line in the above figure. The players are free to go to any scene if they hold enough tokens and scores. Since the game script is designed based on the learning hierarchy and flows, the players will learn and practice accordingly. There are different level of roles in the game to form a Periphery community of practice.

The game is designed based on client-server architecture. The clients side, which the student or teacher faces, handles the user interaction and graphic display. The client also communicates with the server so that other players' information can be shown in the game. Also, it also sends user's behavior back to the server side. Interesting reader can download it from http://db.csie.ncu.edu.tw/~sunny/myssgi.html (in Chinese). The server contains a game server and an educational database. The game server handles the communication among players. The educational database is to record the behavior of the students.

The game also provides a mechanism for players to query the whole scene hierarchy as shown in Figure-2. Thus, the players can know where they are and where they can go. Besides, the mechanism also shows all the players in the game and the location of each player.

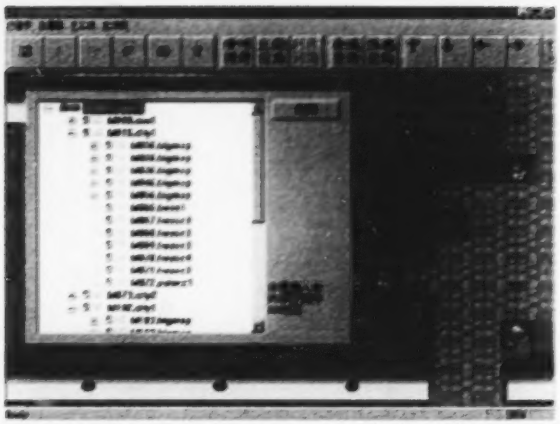

Figure-2 querying the script structure and information of other players

Building a Situated Learning Environment to Promote Learning Motivation and to Prevent Disorientation

To form a situated learning environment, we must do the following things: (1) to build a community of practice, (2) to build a set of communication tool, and (3) to encourage collaborive and cooperative working.

To build a community of practice, the game will assign each player different levels of role with different privilege. The player can query information of other members in the game. Besides, the game also provides apprentice mode to let higher level role guide lower level one in playing.

In the community of practice, members of the community should be able to communicate. Therefore, we build a set of communication tools. The communication tools includes (1) querying players status, (2) calling learning companion, (3) testing a learning companion, (4) asking a learning companion to teach, (5) getting other players as an apprentice, (6) 1-1 talking, (7) discussion room, and (8) broadcast (shout). The game script is designed to encourage collaborive and cooperative working.

Experiment and Discussion

Totally, eight classes students had used this game. Six classes (NGCAI) students play our instructional game and fill the test questions. Two classes (NGCAI) students only read courseware, do practice, and answering question which are exactly the same as embedded in our game without the game elements. After reading the learning materials, they are asked to fill the same test questions. The period for each class experiment is two hours.

For the two classes which only read materials and do practices, most of them quitted in two to three minutes. They also do not know what to do next. However, for the six classes, which play the game, most of them, played two hours. They would like to play the game even after two hours. This shows that the game elements do promote the learner's motivation. Moreover, the students do not have problem of disorientation.

The following are the records the student actions taken in the game which are stored in the database.

Play Action	Count	Percent(%)
send message (shout)	57	1.44
calling to participate chat room	264	6.68
talk in chat room	172	4.35
apprenticeship mode	61	1.54
talk in apprenticeship mode	65	1.64
get good	1037	26.24

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ask question to another	100	2.53
comparison for self & another	1401	35.45
CAI presented	36	0.91
virtual people hint	759	19.21

Table-1 action statistics of students playing the game

From the above statistics, the most frequent events of a player is trying to know this/her and comparing with others. This shows immediate competition can improve the student's motivation. The second frequent actions taken are getting good and virtual person hint. These actions are the main script of the game. They are all embedded with a practice. This shows that a game can attract students to do practices.

Students like to talk to others. It may be a new experience for the students to talk in a computer game. The students may just want to talk with others by computer. In the beginning, the game asks the name of the player. The students were excited when they saw their names shown in the game.

Because the test period is limited to two hours, not many students achieve the level for shouting and calling for chat room. However, the students achieved the level still like to call for a chat room talking. In the table-1, there are 57 times and 61 times for shouting and apprenticeship mode. It illustrated that recognized by others and controlling others are fun for students even though without rewarding for that action. Most students asked questions (65 ask out of 61 apprenticeship) for their teacher in apprenticeship mode. It does provide a way to help low performance students. Table-1 shows that the students seldom read CAI courses in WWW. The major reason is that (1) students are eager to pass each scene, they are reluctant to read the courses because it is slow for passing the scene, and (2) students more like to ask other players directly because it is more efficient.

The following table is to test whether the game can promote the motivation of students as they may expected. The test sheet is designed based on Likert Scale and t test. Each question has four degrees for each : very agree, agree, disagree, and very disagree. The elements are categorized based on the motivation factors.

Rank	Item	NGCAI	SSIG	Change(+:enhance)
1	Fantasy	42.41	66.67	+24.26
2	Cognition	53.01	68.19	+15.18
3	Curiosity	56.70	71.74	+15.04
4	Control	55.54	69.86	+14.32
6	Cooperation	54.82	67.36	+12.54
5	Competition	57.34	70.49	+13.15
7	Challenge	58.71	70.83	+12.12
	Reliability	0.86	0.83	

Table-2 comparison of motivation factors

From the above table, it shows that our game meets the expectation of the students. After the students played the game, all motivation factors are improved. The rank in table-2 shows the ordering of degree of motivation improvement of our game. The first three significant factors are fantasy, cognition, and curiosity. Table-1 also shows that the students feel that the most interesting factors of the game are (1) challenge, (2) competition, and (3) curiosity. After they played the game, the most interesting factors become: (1) curiosity, (2) challenge, and (3) competition. This shows that the most interesting factors of a role playing game are (1) curiosity and (2) challenge. Although the students are very concerned about other players' score that are shown in table-1, the major driving force of keeping working on games is curiosity and challenge.

	high	low	hi-low
Curiosity	66.58	70.25	+3.67
Control	68.91	71.60	+2.69

Challenge	70.92	71.00	+0.08
Fantasy	65.76	66.00	+0.24
Competition	70.29	71.01	+0.72
Cooperation	64.86	68.82	+3.96
Cognition	66.09	69.60	+3.51

Table-3 Comparison of every Motivation item between high and low achievement(1/3) on SSIG

In table-3, we compare the motivation factors for high achievement students and low achievement students. The second column shows the motivation scores of the top one-third students in the class based on the arithmetic test score. The third column is the score of bottom one-third students. The result shows that low achievement students like the game more in every part of the game. It is easier to explain that low achievement students likes cooperation more because they usually need help in answering the questions. About cognition and control item, it may be that lower part students have less chance to be recognized. The problems and game script structure may be easier for them to capture for high achievement students so that the curiosity score for them is lower.

Conclusion

We devised a method to promote learning motivation and prevent navigation disorientation of the students by using a multi-user game that integrates web-based courseware. Effects of motivation factors are also investigated. Experiment shows a game can promote the student motivation to do practice. Moreover, most students do not have the problem of disorientation by using the game. However, to promote students to read courseware by using a game is not easy. More work left to be done to investigate how to use a game to improve the motivation of reading courseware.

Investigation also shows that low achievement students are more likely to be attracted by a multi-user game. The element of cooperation in a multi-user game is important for lower achievement students. A learning game should be designed to meet different level of students. Thus, high achievement students can feel interesting and low achievement student do not feel upset.

Communicate through computer by Chinese typing is difficult for elementary students. Further work should be done to make communication on computer easier.

Reference

[Corrina et al., 1996]Corrina P., David C., and Alexander R. "WebQuest : Substantiating Education in Edutainment through Interactive Learning Games" ,Fifth International World Wide Web Conference May 6-10,1996, Paris, France.

[Corrina et al., 1996]Corrina P., David C., and Alexander R. "WebQuest : Substantiating Education in Edutainment through Interactive Learning Games" ,Fifth International World Wide Web Conference May 6-10,1996, Paris, France.

[Gange, 1968] Gange, R. M., "Learning Hierarchies", Education Psychologist,6, 1968 pp.1-9

[Lepper, 1988] Lepper, M.R. (1988),"Motivational considerations in the study of instruction," Cognition and Instruction, 5(4),289-309.

[Lave and Wenger, 1991] Lave J, Wenger E.(1991) "Situated learning: Legitimate peripheral participation ", Cambridge University Press.

[Malone and Lepper, 1987] Malone, T.W. & Lepper, M.R. (1987)."What makes computer games fun," Byte,6(12),258-277.

[Stipdk ,1993] Stipdk D.J. 1993 "Intrinsic Motivation"Motivation to Learn From Theory to Practice 2nd ed. Allyn and Bacon 1993 pp.59-84.